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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/887,665	01/12/2000	KOJI MINAMI	0925-0154P	9884

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EXAMINER

YENKE, BRIAN P

ART UNIT	PAPER NUMBER
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2614

15

DATE MAILED: 04/23/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/887,665

Applicant(s)

MINAMI ET AL.

Examiner

BRIAN P. YENKE

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on Amendment/Reconsideration (02 April 03).
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 11-17 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 11-17 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

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DETAILED ACTION

1. Applicant's arguments with respect to claims 11-17 have been considered but are not persuasive.

Specification

2. The amended title "A Display Device For Displaying Digital Input Image Data" of the invention is not descriptive. The following title is suggested: "A Display Device For Displaying Digital Input Image Data Using Different Filter Segments For The Lower and Higher Order Bits".

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

- 3a. Claims 11-13, 15 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kunzman et al., US 6,054,832 832 in view of Hewlett et al, US 5,812,303

In considering claims 11-12 and 15;

- a) *the claimed light source...* is met by lamp 14 (Fig 1)

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b) the claimed light-transmitting filters... is met by color wheel 18 which includes a respective blue, red, green and clear (white) (50, 54) color segments (Fig 4)

c) the claimed light valve... is met by spatial light modulator 28 (Fig 1)

However, Kunzman remains silent on which filter (white, non-white) is used in displaying information corresponding to the higher-order and lower-order bits of digital data. Kunzman does disclose a color wheel 18 which includes clear filter segments (50,54) which are used to increase the color efficiencies (col 2, line 15-35) and to control the brightness for all areas of the image, making dark areas appear correctly, while not washing out the bright areas (col 3, line 11-21), where the clear (white) filters are used to properly transmit the correct colors at the proper timing, where the clear segment is used to transition properly between segments (col 4, line 38-44). Kunzman also discloses a color wheel 18 which includes a blue, green and red segment (Fig 4).

The examiner incorporates, Hewlett et al., US 5,812, 303 which discloses the use of NDF (neutral density filter) for each color (RGB), where the NDF filter is used in conjunction with the respective color (RGB) segment. The NDF segment is used to display the lower order bit thereby increasing the minimum amount of time for display of the lower significance bits (col 2, line 9-14) while displaying the most significant bits with the RGB filters, which allows more bits per sample in the display images and produces images with fewer artifacts and images that more closely match that of conventional display systems (col 2, line 9-18).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify, Kunzman which discloses an electronically

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programmable color wheel which includes clear filter segments to control the brightness of all areas of the image and to properly transmit the correct colors at the proper time, with Hewlett, by incorporating neutral density filters into the color wheel, to display an image with fewer artifacts, and increasing the number of bits available for display.

In considering claims 13 and 17,

The claimed wherein if brightness required by the input data...is met by Kunzman

Which utilizes the clear (white) segments of the color wheel 18 to adjust the dark states/areas of the image and the brightness state/area of the image (col 3, line 11-22, line 59-67 to col 4, line 1-9)

3b. Claims 14 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kunzman et al., US 6,054,832 in view of Hewlett et al, US 5,812,303 and applicants admitted prior art.

In considering claim 14,

Kunzman does not specifically disclose a spatial light modulator that reflects, Kunzman discloses a spatial light modulator (light valve) which is used to (transmit) the display received image data onto a display.

The use of a spatial light modulator such as a digital micro-mirror device (DMD) is a well-known type of modulator which transmits/reflects image data by either being in the on/off state, which increase the overall efficiency of the display system, by decreasing dead/lag times between color-changes.

As disclosed by applicant Fig 2, Page 2, line 20, the use of a DMD device is a conventional light valve which is used to display image data, where the DMD device is either in an Off or On state.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Kunzman, which discloses an electronically programmable color wheel to increase the efficiency of the displayed image, by eliminating transitions between colors and increasing brightness, with a conventional light valve's such as a DMD which is used to increase the efficiency of a displayed image.

In considering claim 16,

Kunzman does not specifically disclose/discuss a value which is obtained by integrating the product of spectral transmission factor of the white light filters and the spectral luminous efficiency with respect to wavelength being less than the sum of values of the non-white filters in the calculation.

However, as disclosed by applicant's admitted prior art, Fig 2, a color wheel with filter segments Crd, Cgd, Cbd of lower transitivity to increase the grey scale of the image data, where the filter segments Crd, Cgd and Cbd have a transitivity of $1/8$ their respective filters Cr, Cg and Cb. The filter segments Crd, Cgd, and Cbd, are used to increase the grey scale (brightness) of the displayed image.

Therefore, it would have been obvious to one skilled in the art at the time of the invention to modify Kunzman, which discloses a display system which utilizes clear/white segments in a color-wheel to increase the efficiency and brightness of a

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displayed image, with applicant's admitted prior art, which would produce a value (as claimed) where the value of the clear (white) filter is less than the non-clear (white) filters (R,G,B), since the clear filter segments are used to enhance the color/brightness of a displayed color image (not a black-white image).

Applicant's Arguments

- a) Regarding claims 11-17, applicant states that Kunzman has a specific wheel configuration that has 100 degrees of each of R, G and B and 40 and 20 degree segments of white. Applicant also states, that further, Kunzman, explicitly teaches to have the 40 degree segment directly opposing the green segment. Applicant states that Kunzman also teaches "...the clear, or white..., segment of the wheel is controlled independently of the other colors, as if it were one of the primary colors (red, green or blue).
- b) Regarding claims 11-17, applicant states that Hewlett only teaches three primary colors (RGB) are used with a portion of each color segment having a lower color density. Hewlett teaches a three segment wheel having equal portions (120 degrees) of R, G and B respectively.
- c) Regarding claims 11-17, applicant states that since Hewlett teaches a three segment color wheel having equal portions (120 degrees) is in direct contradiction to teachings of Kunzman which teaches to have at least 4 separate segments having R, G, B and Y.

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Examiner's Response

a) The examiner agrees that Kunzman discloses a color wheel having RGB segments along with clear segments (using RGBY data) which are used to make the color efficiencies higher in order to produce a better image. Kunzman also discloses that a typical three-color wheel (RGB), each color gets 33% of the frame time, resulting in 33% of the total light available during a frame period being used for that color (col 2, line 58-65).

It is also noted by the examiner that the applicant also states in the specification (page 24, line4) that color filters corresponding to Y(yellow), M (magenta) and C (cyan) may be formed on the color wheel, in addition to R, G, and B. The color filters are not always restricted to R, G, and B color filters.

b) The examiner agrees that Hewitt teaches a three segment wheel having equal portions of R, G and B. Hewitt also discloses that the neutral density filter could be used on clear wheel having a gray NDF region (col 5, line 24-33). Hewitt discloses a system which allows the display of bits for longer periods of time overcoming the limitation of a certain minimum amount of time for display of the lower significant bits, which allows more bits per sample, producing images with fewer artifacts and images that more closely match those of conventional systems.

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c) The examiner disagrees. As stated above, Hewitt discloses an invention to enhance the conventional systems (RGB) by using a neutral density filter which allows the least significant bit of the data sample to be lengthened and thereby eliminate the constraint on the number of bits available for display.

Kunzman also discloses that typical/conventional systems employ three colors (col 2, line 58-65), however Kunzman also adds a clear segment to incorporate the addition of Y data using white light derived from the RGB inputs. Kunzman also discloses, that the Y signal may be derived from the RGB input may be different than the white produced by the lamp through the clear segment. Kunzman also discloses that in order to associate the correction coefficients such that any color wheel module can be used in any projector, the coefficients must be stored on the color wheel itself, or an indication of the color wheel type must be detectable (col 8, line 21-30).

Furthermore, as stated above, the applicant also discloses (page 24, line 4) that color filters corresponding to Y(yellow), M (magenta) and C (cyan) may be formed on the color wheel, in addition to R, G, and B. The color filters are not always restricted to R, G, and B color filters.

The Hewlett reference discloses the use of a neutral density filter which allows the use of more bits per sample producing images with fewer artifacts. Hewlett discloses that a single color wheel with RGB colors, or a two wheel system (one with one color the other wheel with two colors) may be used, or alternatively a clear segment using a colored source of light may be used. Therefore, Hewlett discloses a system

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where the neutral density filter may be used with RGB wheel segments as well as a clear segment, to produce an image with reduced artifacts.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify, Kunzman which discloses an electronically programmable color wheel which includes clear filter segments to control the brightness of all areas of the image and to properly transmit the correct colors at the proper time, with Hewlett, by incorporating neutral density filters into the color wheel, to display an image with fewer artifacts, and increasing the number of bits available for display.

Conclusion

4. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

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5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian Yenke whose telephone number is (703) 305-9871. The examiner work schedule is Monday-Thursday, 0730-1830 hrs.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's Supervisor, John W. Miller, can be reached at (703)305-4795.

Any response to this action should be mailed to:


Commissioner of Patents and Trademarks
Washington, D.C. 20231

or faxed to:

(703) 872-9314

Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal Drive, Arlington, VA, Sixth Floor (Receptionist). Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Technology Center 2600 Customer Service Office whose telephone number is (703)305-4700.

B.P.Y.
08 April 2003


JOHN MILLER
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600